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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/620,176

07/15/2003

Michael A. Bryan

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07/18/2006

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EXAMINER

MOONEY, MICHAEL P

ART UNIT

PAPER NUMBER

2883

DATE MAILED: 07/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/620,176 | BRYAN ET AL. | |
| | Examiner | Art Unit | |
| | Michael P. Mooney | 2883 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-22, 24-27 and 53-63 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-22, 24-27, 53-63 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 17 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

An occurrence of a form of the word "irradiate" appears in claim 17 on each of lines 2, 4, and 6, respectively, of the said claim. It is not absolutely clear that the occurrence on either line 4 or line 6 is the same irradiation as that referred to on line 2 of the said claim 17. This renders claim 17 ambiguous.

The said claim may be interpreted such that the form(s) of irradiation referred to on lines 4 and 6 are (each) from different direction(s)/position(s) when compared to the form of irradiation referred to on line 2 of claim 17. One of the broader interpretation(s) will be taken in the below prior-art rejection.

Correction of the ambiguity is required.

It is suggested that the aforementioned ambiguity may be corrected by rewriting claim 17 as follows (underlining and some bold added to more clearly show changes):

17. A method for producing a gradient in index-of-refraction in an optical material comprising a photosensitive optical material, the method comprising irradiating the photosensitive optical material to create a light-induced gradient in index-of-refraction wherein the **said** irradiating of the photosensitive optical material is performed for a selected period of time with light having an intensity and wavelength to induce the **said** gradient in index-of-refraction **along the direction of said irradiating**, [along an irradiation direction] the gradient in index-of-refraction at least about 1×10^{-8} index units per micron.

In order to preclude the use of the Payne et al. reference with respect to the fact that the gradient/grating is produced by light beams that are approximately orthogonal (and/or, e.g., up to approximately 45 degrees from the said orthogonal) to the grating produced, Applicant must make changes commensurate with those shown above for claim 17.

Claim 17 as it appears in its 12/1/05 Amendment wording does not preclude the use of the Payne et al. reference for rejection. As already explained above, the language of the 12/1/05 version of claim 17 does not preclude the use of reference(s) wherein the form of irradiation of line 4 and/or line 6 of the 12/1/05 version of claim 17 comes from a direction other than that of the "irradiating" referred to on the second line of the 12/1/05 version of claim 17. E.g., other irradiating source(s) may be used to direct radiation through the gradient/grating produced in the Payne et al. reference. Hence, a rejection under Payne et al. is currently appropriate and appears below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 17-22, 24-27, 53-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Payne et al., U.S. Patent 6,160,944.

Regarding independent claim 17, Payne et al. teach a method for producing a gradient in index of refraction in an optical material comprising a photosensitive optical material (col 8, lines 12-15 and Fig 5, ref sign 210), the method comprising irradiating (col 3, lines 6-12, especially line 12) the photosensitive optical material to create a light-induced gradient in index of refraction (col 3, lines 6-12, especially lines 8-9 "linear refractive index variation").

However, the reference is silent with respect to the irradiation of the photosensitive optical material is performed for a period of time with light having an intensity and wavelength to induce the gradient index of refraction.

Payne teaches specific irradiating times and intensities to write a grating (col 7, lines 12-14 and 18-22).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to irradiate the photosensitive optical material for a period of time with light having an intensity and wavelength to induce the gradient index of refraction along an irradiation direction.

The motivation is to induce the gradient as well as not damage the device (col 7, lines 21-24).

Furthermore, the gradient in index of refraction is at least about 1×10^{-8} index units per micron since index changes of 1×10^{-3} (col 7, lines 43-44) over 15 mm (col 7, lines 14-15) are contemplated and $1 \times 10^{-3} / 15 \times 10^3$ microns is about 6.7×10^{-8} index units per micron.

Thus claim 17 rejected.

Regarding claim 18, the optical material comprises a planar optical structure (Fig 5, ref sign 230). In addition, the irradiation is along a length (col 3, lines 6-9, especially line 9)

Regarding claim 19, Payne et al. teach the limitations of claim 18 as described above. Furthermore, the gradient in index of refraction is oriented along the plane of the structure since it is generated along a length of waveguide (col 3, lines 6-12, especially line 9).

Regarding claim 20, Payne et al. teach the limitations of claim 18 as described above. While the reference does not specifically state "oriented perpendicular to the plane of the structure", there would be a gradient oriented perpendicular to the structure as well since radiation is absorbed as it passes through the photosensitive material and more absorption occurs as the radiation passes through more material (i.e. the deeper into the material).

Regarding claim 21, Payne et al. teach the limitations of claim 17 as described above. Furthermore, the optical material can also comprise a preform (col 4, lines 58-61 and Fig 1, ref sign 100). In addition, the aspect ratio ($a=L/D$) is clearly at least about 5 since the diameter is about 5 microns (col 6, line 50) and the length is measured in kilometers (col 6, line 51).

Regarding claim 22, Payne et al. teach the limitations of claim 17 as described above. Furthermore, the photosensitive optical material comprises at least about 1 mole percent germanium as a fraction of the total metal/metalloid content of the photosensitive optical material (col 5, line 22).

Regarding claim 23, Payne et al. teach the limitations of claim 17 as described above. Furthermore, the irradiating is performed for a selected time of period with light having an intensity (col 8, line 23 since saturation is controlled) and wavelength (col 4, lines 36-39 since UV light is selected) to induce the gradient index of refraction along the irradiation direction.

Regarding claim 24, Payne et al. teach the limitations of claim 23 as described above. Furthermore, the light intensity and composition of the photosensitive material produce absorption of light in the linear Beer's law regime of spatial variation since saturation may not occur (col 8, lines 23-27).

Regarding claim 25, Payne et al. teach the limitations of claim 23 as described above. Furthermore, the light intensity and composition of the photosensitive material produce absorption of light with non-linear spatial variation since saturation can occur (col 8, lines 23-27).

Regarding claim 26, Payne et al. teach the limitations of claim 17 as described above. Furthermore, the photosensitive optical material comprises a gradient composition of a dopant that induces photosensitivity of the material wherein the composition gradient results in the index-of-refraction gradient following illumination (col 3, lines 8-9 "linear refractive index variation") since there is a linear gradient refractive index and the photosensitive material changes refractive index upon illumination (col 3, lines 11-12). Additionally, it is a conventionally known technique in the art to use a type of gradient in doping levels to form a Bragg grating.

Regarding claim 27, Payne et al. teach the limitations of claim 17 as described above.

However, the reference is silent with respect to the gradient extending across a distance of at least 10 microns.

Payne et al. does teach that a gradient can be used in a beam-size adjusting device to change the size of a guided beam (col 3, lines 6-12).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Payne et al. to have the gradient extending across a distance of at least 10 microns in order to reduce the beam diameter to small diameters.

The motivation is to increase intensity.

By the reasons and references given above each and every element of each of claims 53-63 is rendered obvious under Payne et al. and/or conventionally known art-established principles. If Applicant disagrees with this obviousness holding, then Applicant should submit evidence showing this obviousness holding is errant. Examiner will then reconsider a restriction requirement for claims 53-63. Thus claims 53-63 are rejected.

Response to Arguments

Applicant's arguments filed 12/1/05 have been fully considered but they are not persuasive. Some of Applicant's arguments are hinged on being able to use a very narrow definition of the word "gradient" which may exclude a Bragg grating from having

gradient characteristics. It is, however, reasonable to state that a Bragg grating may have a gradient.

Furthermore, Applicant points out, on page 9 of the 12/1/05 Remarks, that the index variations in a grating are formed "perpendicular to the irradiation direction". The Office does not contest this. It is true that, in general, Bragg gratings are formed by directing radiation from a direction that is essentially perpendicular (plus or minus 45 degrees or so) to the direction in which the grating elements are being formed.

A problem with instant claim 17, however, is that the said claim 17 fails to definitively limit/rule out irradiating from a direction that may be perpendicular (or close to perpendicular). The reason why claim 17 fails to limit out radiation coming from a near-perpendicular direction is more fully explained in the 112 rejection given above. See also the paragraph after this one *infra*.

There is especially a problem with the phrase "along an irradiation direction" on line 6 of instant claim 17. This phrase can be interpreted as light that comes from a source of irradiation that directs the light in the direction that the grating/gradient is being formed. Thus, the wording of instant claim 17 must be changed before a reference such as Payne et al. can be eliminated because, certainly, the Payne et al. reference allows for the propagating of some form of irradiation along the direction of the grating/gradient being formed. E.g., it is conventionally known technique in the art to send a test signal along the direction of the grating/gradient being formed *while* the grating/gradient is actually being formed.

Also, doping is used in Payne et al. for the formation of a Bragg grating, thus, by the reasoning given above regarding a Bragg grating having a gradient, it can also be said that doping is used in Payne et al. for the formation of a gradient via a gradient in the dopant. Additionally, it is conventionally known in the art to use type of a gradient in doping levels to form a Bragg grating.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sceats et al. (6636665) and Kokura (6370301) are examples of teaching the testing of a grating by sending a test irradiation signal along the direction of the grating/gradient being formed *while* the grating/gradient is actually being formed

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael P. Mooney whose telephone number is 571-272-2422. The examiner can normally be reached during weekdays, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on 571-272-2415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

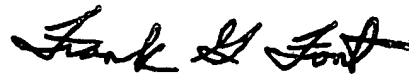
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Michael P. Mooney
Examiner
Art Unit 2883



Frank G. Font
Supervisory Patent Examiner
Art Unit 2883

FGF/mpm
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